

ALBERTA TRANSPORTATION AND
ECONOMIC CORRIDORS
GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION (PEACE RIVER DISTRICT)
2025 INSPECTION



Site Number	Location	Name	Hwy	km
PH041	Daishowa East Hill	Daishowa Ditch Erosion (formerly referenced as Site 5 km31.6 to km32)	986:01	31.916
Legal Description		UTM Co-ordinates		
NE12-85-21 W5M		11V E 489875	N	6246293

	Date	PF	CF	Total
Previous Inspection:	18-July-2024	9	4	36
Current Inspection:	14-May-2025	9	4	36
Road AADT:	1020		Year:	2024
Inspected By:	Rocky Wang, TEC		Tyler Clay, Thurber Don Proudfoot, Thurber	
Report Attachments:	<input checked="" type="checkbox"/> Photographs		<input checked="" type="checkbox"/> Plans	<input type="checkbox"/> Maintenance Items

Primary Site Issue:	<p>The site involves a roughly 300-meter segment of highway that runs east-west along the south face of a drainage valley. It is located just downstream (west) of the PH007 site, separated by a pond caused by a shallow creek gradient and active beaver dams. The site was originally part of a larger, 2 km long PH007 site, which has since been subdivided into four sites: PH041, PH007, PH042, and PH043.</p> <p>Prior to 2004 mitigation repairs, the site experienced channel erosion and landsliding with several issues near the top of the north highway embankment (km 31.850). This landslide was actively monitored up until 2020 with inclinometers installed in the 1990's that historically have shown very slow movement rates.</p> <p>In July 2024, a high flow event caused extensive damage to both the armoured channel and the gabion drop structure downstream of the beaver pond.</p>
Dimensions:	Channel inlet to gabion structure outlet is approximately 200 m. Roadway is approximately 30 m above creek elevation in this area.
Date of Remediation:	In 2004, erosion repairs and mitigation work were completed, which included a new riprap armoured channel constructed near the highway embankment toe (downstream of the beaver pond) and a curved gabion basket drop structure (about 50 m long with an 8.5 m elevation drop) placed at the west end of the new channel.
Maintenance:	None

Observations:	Description	Worsened?
<input type="checkbox"/> Pavement Distress		<input type="checkbox"/>
<input type="checkbox"/> Slope Movement		<input type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	<p>The beaver dam and pond were intact at the east end of the site, with no visible damage to the dam structure. Previous overflow channel areas identified in 2024 were rebuilt by the beavers where water overtopped the dam during high flow conditions. (Photo 41-1).</p> <p>The armoured channel between the beaver dam and gabion drop structure had minor riprap displacement in the upstream 40 m length of the channel. The remaining downstream length of the armored channel had significant scour, channel bed degradation and washout of the rock riprap that exposed and damaged the underlying geotextile. The most extensive damage occurred within a 30 m length between approximately km 31.85 and km 31.88 where most of the channel bottom was washed out below the geotextile fabric and scour had left near vertical banks up to 2 m in height. There was slightly increased scour and bank sloughing since 2024. (Photos 41-02 and 41-03).</p> <p>Extensive damage occurred to the gabion drop structure due to the July 2024 high flow event. Within the upper portion of the drop structure damage was primarily localized to the flow centreline within a 15 m long and 3 m wide segment. There was major gabion basket deformation, wood debris buildup, broken wire and washout of the rock from damage baskets. Due to scour below the baskets the channel bed elevation had dropped by up approximately 1 m resulting in a sunken U-shaped channel profile along the centreline of the structure. (Photos 41-04 and 41-05).</p> <p>The lower downstream section of the drop structure below the curve towards the north had the most extensive damage due to erosion scour resulting in a 2 m vertical drop causing undermining and collapse of the gabion sidewalls for an approximately 15 m length section. The eastern lower gabion sidewall was still intact but had fallen inwards towards the channel centreline scour area. Most of the centreline gabion baskets were sunken, heavily deformed and had wire pulled apart resulting in loss of rock. Basket deformation and scour were slightly rose from the 2024 condition. (Photos 41-06 to 41-09)</p> <p>At the bottom of the drop structure, riprap had been displaced downstream and there was silt and sand buildup (Photo 41-10).</p>	<input checked="" type="checkbox"/>
<input type="checkbox"/> Seepage		<input type="checkbox"/>
<input type="checkbox"/> Bridge/Culvert		<input checked="" type="checkbox"/>
<input type="checkbox"/> Other		<input checked="" type="checkbox"/>

Instrumentation (Last Readings Fall 2020):

Slope Inclinometers	<p>Both SI's were last read in 2020 and are not currently part of the instrumentation monitoring program.</p> <p>SI 1 and SI 2 are located approximately 15 m and 30 m downslope (north) of the Highway 986 pavement edge respectively near km 31.87. The thalweg of the armoured channel near the toe of the highway embankment (approximately 12 m in height) is located approximately 62 m downslope from the north edge of the highway.</p> <p>Slope inclinometer SI-1 showed no discernible movement over 0.1 m to 1.9 m depth, a rate of movement of 1.1 mm/y over 1.9 m to 4.9 m depth, a rate of movement of 0.2 mm/yr over 4.9 m to 7.4 m depth and a rate of movement of 0.7 mm/yr over 7.4 m to 8.6 m depth since the spring of 2020 readings. Since 1995 there has been 31 mm of total cumulative resultant movement measured in the upper 5 m. Deeper movements at this instrument have historically had average movement rates less than 2.0 mm/yr.</p> <p>Slope inclinometer SI-2 showed rates of movement of 1.7 mm/yr and 0.5 mm/yr over 5.6 m to 8.6 m depth and 13.5 m to 14.7 m depth, respectively, since the spring of 2020 readings. Since 1996 there has been 12 mm of total cumulative resultant movement measured at a depth of approximately 7 m, with a historically average movement rate less than 1.0 mm/yr.</p>
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Assessment:

The July 2024 high flow event resulted in extensive damage to the 2004 erosion control structures. The performance of the erosion control mitigation since installation at the site has generally been observed to be effective with expected minor maintenance issues. The damage observed following the high flow event could be the result or combination of an unprecedented flow event and/or exacerbation of cumulative degradation damage below the structures that had limited surficial visibility (e.g., minor subsurface voids and erosion channels beneath the baskets that were small enough to be spanned without significant deformation).

In its current condition the erosion control structures have significant reduction in mitigating against gully erosion along the steeper gradients of the Unnamed Creek channel. A future high flow event and/or dam breach could result in further channel downcutting and bank undermining. To minimize the rate of future degradation and asset damage in the short term, the channel and drop structure should be reinforced by salvaging the displaced riprap rock at the downstream end of the drop structure to infill major scour areas/voids. The use of low-strength density controlled fill (grout/fillcrete) could be considered to infill major voids beneath the gabion drop structure; however, this could increase future deconstruction and repair efforts. The channel upstream of the drop structure should be graded to a smooth profile and have non-woven geotextile placed prior to armouring with salvaged riprap rock. At a minimum, redistribution of the existing channel riprap to the channel thalweg would be beneficial to limit the rate of ongoing soil loss and channel downcutting.

A full repair of the curved gabion drop structure is not anticipated to be practicable or effective in the long-term without extensive deconstruction and excavation surrounding the current structure.

Due to loss of soil and the expected increase in the rate of bank erosion occurring near the base of the north highway embankment, there could be increased rates of movement within the monitored slide area near km 31.87. To date measured movements in this area have historically been very slow with no observable damage to the highway or surficial signs of movement downslope of the highway. However, it would be advisable to add SI2 back onto the monitoring program to check if the scour has had an effect on slope stability.

Recommendations:

Short-Term:

- Salvage and redistribute washed-out riprap to upstream areas with significant scour/soil exposure placed over non-woven geotextile. Redistribute some of the washed out rock to protect the more vulnerable exposed bank areas on the drop structure.

Medium and Long-Term:

- Rebuild armoured channel with larger riprap rock and keyed-in check dams (built with gabion or angular riprap), cut-off walls or impermeable liners. Widen the channel bottom to match intake into the drop structure.
- Construct new gabion drop structure with hydrotechnical engineering input.
- Consider armouring and/or engineered overflow controls at the beaver dam to minimize overtopping failure.

Ongoing Investigation/Monitoring:

- This site should be included in the GRMP inspections on an annual basis.
- Hydrotechnical assessment should be considered to better characterize the 2024 high flow event, consider implications of climatic changes for design performance and as input for future mitigation design.
- Downcutting that occurred within the armored channel downslope from the instruments because of the July 2024 high flow event could result in reduced toe support and stability of the lower embankment. SI readings should be added back to the annual monitoring program to check if there is any additional slope movement.

Closure

It is a condition of this letter report that Thurber's performance of its professional services will be subject to the attached Statement for Use and Interpretation of Report.

Don Proudfoot, M.Eng., P.Eng.
Partner | Senior Geotechnical Engineer

Tyler Clay, P.Eng.
Geological Engineer



STATEMENT FOR USE AND INTERPRETATION OF REPORT

1. STANDARD OF CARE

This Report has been prepared in a manner consistent with that degree of care and skill ordinarily exercised by members of the same profession currently practicing under similar circumstances at the same time and in the same or similar locality and in compliance with all applicable laws.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment, including this Statement For Use and Interpretation of Report, are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT, AS DESCRIBED ABOVE. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE OF THE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives, and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

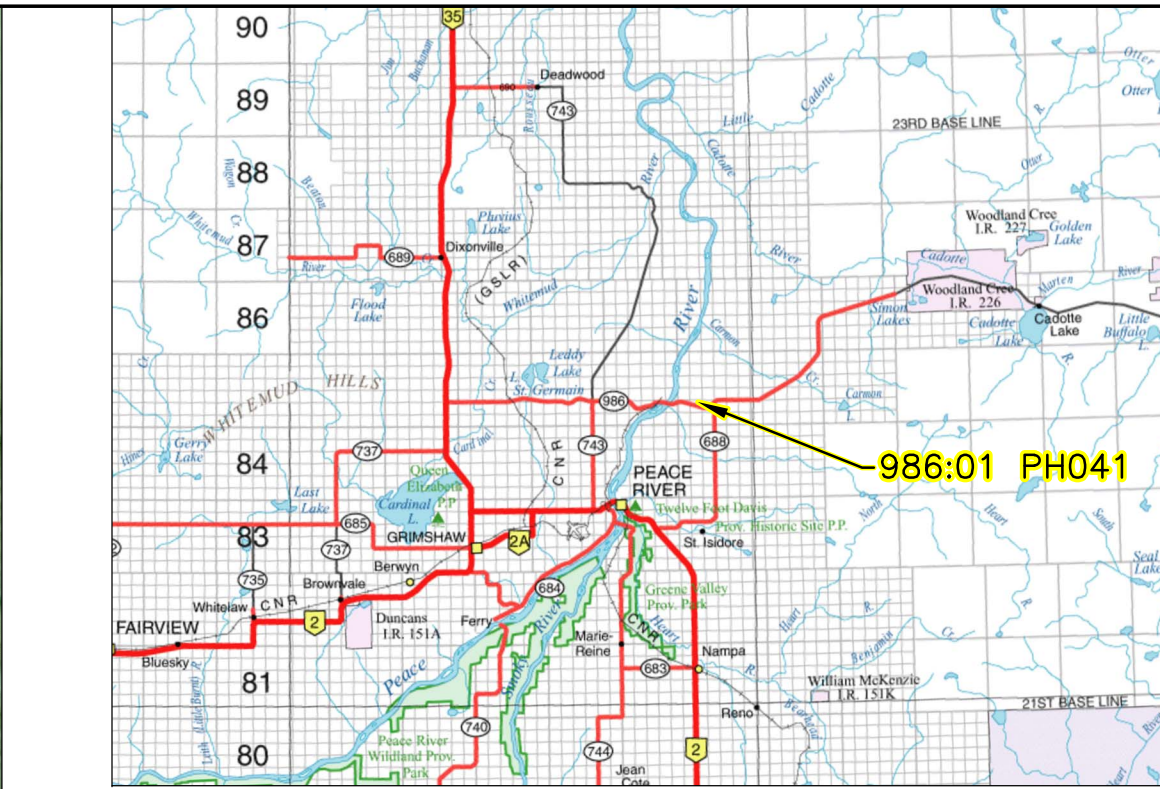
The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client for the development, design objectives, and/or purposes described to Thurber by the Client. **NO OTHER PARTY MAY USE OR RELY ON THE REPORT OR ANY PORTION THEREOF FOR OTHER THAN THE CLIENT'S BENEFIT IN CONNECTION WITH THE PURPOSES DESCRIBED IN THE REPORT.** Any use which a third party makes of the Report is the sole responsibility of such third party and is always subject to this Statement for Use and Interpretation of Report. Thurber accepts no liability or responsibility for damages suffered by any third party resulting from use of the Report for purposes outside the reasonable contemplation of Thurber at the time it was prepared or in any manner unintended by Thurber.

5. INTERPRETATION OF THE REPORT

- a) **Nature and Exactness of Soil and Contaminant Description:** Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors is inherently judgement-based. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other parties making use of such documents or records with or without our express written consent need to be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other parties. Some conditions are subject to change over time and those making use of the Report need to be aware of this possibility and understand that the Report only presents the interpreted conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client must disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- b) **Reliance on Provided Information:** The evaluation and conclusions contained in the Report have been prepared based on conditions in evidence at the time of site inspections and based on information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report resulting from misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other parties providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
- c) **Design Services:** The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber is recommended to be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design need to be reported to Thurber immediately so that Thurber can address potential conflicts.
- d) **Construction Services:** During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions to confirm and document that the site conditions do not materially differ from those conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or other parties who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes, but is not limited to, decisions made to develop, purchase, or sell land, unless such decisions expressly form part of the stated purpose of the Report as described in Paragraph 3.



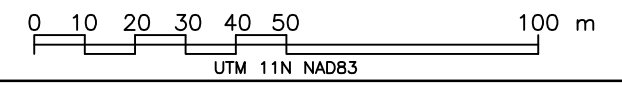
KEY MAP
SCALE 1:1 000 000

LEGEND:

HORIZONTAL CHAINAGE	● 32+100
PHOTOGRAPH LOCATION	📷 41-01
SLOPE INCLINOMETER	
- NO MOVEMENT	🟢 SI 64
- CREEP	🟡 SI 62
- MEASURABLE MOVEMENT (OR RECENTLY SHEARED)	🔴 SI 82



- NOTES:**
- 1 FIGURE MUST BE USED IN CONJUNCTION WITH THE ATTACHED REPORT REFERENCE 32121 DATED OCTOBER 2025 AND IS SUBJECT TO ANY LIMITATIONS DESCRIBED THEREIN.
 - 2 AIR PHOTO BASE FROM DRONE IMAGERY COLLECTED JULY 18, 2024 AND ESRI (DIGITAL GLOBE, 2016).
 - 3 FEATURES/PHOTOGRAPH LOCATIONS SHOWN APPROXIMATE ONLY.
 - 4 FIELD OBSERVATIONS FROM MAY 14, 2025 SHOWN IN RED.



Alberta Transportation

PEACE REGION (PEACE RIVER DISTRICT)

**DAISHOWA
HWY 986:01 (PH041)
LOCATION PLAN**

FIGURE PH041-1

DRAWN BY	ICB
DESIGNED BY	TTC
APPROVED BY	DWP
SCALE	1:1 500
DATE	OCTOBER 9, 2025
FILE No.	32121-A3G





Photo 41-01.: Standing by the beaver dam near km 31.95 looking north at the upstream pond. Dam was intact and previous 2024 breach areas had been infilled from beaver activity.



Photo 41-02.: Looking west (downstream) at the downcutting erosion within the channel near km 31.75 from the 2024 high flow event that washed out the riprap and exposed the geotextile. Erosion was slightly deeper within the thalweg relative to the 2024 condition.



Photo 41-03.: View downstream (west) of the riprap displacement and north bank undermining near km 31.825. Some additional bank slumping relative to the 2024 condition.



Photo 41-04.: View from the top/inlet of the curved gabion drop structure looking towards the northeast near km 31.79. Within the centre of the structure there was major basket deformation, broken basket wires and loss of rock due to downcutting within the thalweg. Scour below the baskets has resulted in an approximately 1 m drop in channel elevation. No major change from 2024.



Photo 41-05.: View downstream (north) at the corner of the drop structure with extensive damage to the gabion baskets and wood debris buildup. Condition appeared slightly worse relative to the 2024 condition.



Photo 41-06.: View towards the northeast at the top of the gabion sidewall section that pulled apart and collapsed due to deep scour that undermined the base of the structure within the lower section. Some additional basket deformation and rock loss relative to the 2024 condition.



Photo 41-07.: View northwest towards the top of the gabion sidewall section that pulled apart and collapsed due to deep scour that undermined the base of the structure within the lower section. Slightly more visible damage relative to the 2024 condition.



Photo 41-08.: Close-up of scour plunge hole at least 2 m deep that has formed within the thalweg downstream of the drop structure corner.



Photo 41-09.: View upstream (south) from the bottom of the drop structure. Extensive deformation and collapse of the structure due to scour and undermining below the baskets within the channel centreline. Minor downwards movement of the baskets towards the channel thalweg within the downstream section of the structure since 2024.



Photo 41-10.: Downstream view towards the west of the buildup of washed out riprap below the gabion drop structure within the natural channel.